

THE
HEALTH OF CHILDREN
IN THE
NURSERY AND SCHOOL.

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THE HEALTH OF CHILDREN.

A FIRST series of observations on the variations of body-heat in infants and children, made, as a foundation for the study of the diseases of childhood, mostly in the ten years before 1865, has long been out of print. Further enquiries of the same kind led to some hygienic comments recently embodied in "Health in the Nursery," a contribution to the volume entitled, "Our Homes, and how to make them Healthy," published by Messrs. Cassell; their kind permission enables me to add many extracts from this later publication to the reprint of my earlier paper. My best thanks are also due to Messrs. Cassell, for the opportunity of including among more strictly medical essays the diagrams prepared by them at my suggestion, from vol. xxxiii. of *The New York Medical Journal*, of the normal rate and ratio of growth in the first year of infancy. These illustrate the way in which our first start in life is made; they need to be brought to the more special notice of professional readers, as our medical text books give no standard by which healthy infantile development can be judged by, and it is but quite lately that the very constant physiological loss of weight in the first week of independent existence has been noticed in our medical journals as well established.

Among the more recently acquired facts bearing on the subject in hand are the determinations, by Dr. Percy Frankland, of the relative proportion of germs found in the air under different circumstances. These were brought before the Society of Arts, March 22nd, 1887. Fewer germs of decay are found in country air than in town air; fewer in winter than in summer. In January, about 600 cubic inches of air passed through a glass tube lined with prepared gelatine produced four colonies of germ centres, while in August 105 were obtained in the same way. On May 19th, 1886, the air on Primrose Hill gave 9 colonies, at the foot 19 were obtained; the number from air above the dome of St.

Paul's was 11, from the churchyard below it was 70. In Exhibition Road, when crowded, on June 8th, 1886, the air yielded 554 colonies. Few germs are found in the air of rooms when very still and quiet, but many if dust arises. From a room tenanted and closed dust should be removed in a moist state. In an occupied room germs are not the only spoilers of the air; the carbonic acid given off by respiration is almost equalled by the organic emanations constantly going on. It is most important for children, whose resistance to the encroachment of adverse influences is less than in adults, to have ready access to fresh air in open spaces. The ill effects of any leakage from gas pipes on health, set forth by Dr. Richardson in "Our Homes," has since received further elucidation from Dr. Corfield.

SANITARY defects in dwellings are most plainly shown in spoiling the health of children; the young soonest suffer from bad air, noxious vapours, damp, dust, and want of cleanliness. Into houses where the children are lively and well we may be sure no sewer-gas enters; this may not be the particular cause of illness where children are sickly, but some violation of sanitary law will be found that checks healthy development. Nowhere is the right of health to be more vigorously maintained, or more jealously guarded, than in the nursery; for while the neglect of sanitation here saps the cheerfulness of childhood, and ruins the fair prospect of youth, nowhere is attention to sanitary law more promptly and permanently rewarded than in the normal evolution of all we hope for in the young. The healthy condition of the child, and the means of ascertaining it, will be set forth as the measure of how far the children's rooms at home and at school are made healthy.

The details of nursery fittings must vary extremely in the different grades of society, while many of the same details of nursery management can be commonly carried out; the principles to be kept in view are the same in all stations of life, and may often be as well observed in the poorest as in the richest dwellings. No amount of grandeur will keep mansions free from noxious gases; the most costly chamber soon becomes unhealthy if constantly occupied. Luxury can add nothing to the pure milk required by infants; when this has to be supplemented, the same care must be taken that the added food should be fresh and uncontaminated, a care required earlier and oftener among the rich than among the poor. Arrest of nutrition, actual starvation, from dieting an infant on what it cannot assimilate, is still frequent among all classes. Danger from placing a baby

in the horizontal position the moment it has finished a full meal, or of covering its face completely during sleep, may happen on a bed of down. Sleep may be prevented by tight bands, or miserable swathes, in a satin bassinette or gilded cradle. Warmth can be kept by plain clothes or loose wraps, while all the evils of chill may be suffered in the embroidered dress of fashion.

“ If onely to go warme were gorgeous
Why Nature needs not what thou gorgeous wear’st,
Which scarcely keepes thee warme.”

King Lear, Act II., sc. 4.

Children are the better for frequent changes of room ; they have to spend most of their time in the house ; they require short intervals between their meals, with quick transitions from play to rest. The meals should be taken where there is no litter of toys ; a quiet room is needed both for work and sleep. Means of getting change of air, and of taking exercise within-doors or under cover, are essential. Children thrive best with free and frequent access to the outer air ; no attempt should be made to render any suite of apartments for the young independent of this, and any arrangement that makes it difficult for children to get out of doors is to be avoided. The infant schools for the poor in large towns are distinctly useful in bringing young children, from the rooms they occupy at home, into the fresh air twice a day. All schoolrooms are now improved.

Home life to the younger members of a family and to the gentler sex means that by far the largest part of every day must be spent indoors, and half of it—at least for the very young—in the bed room. No attempt should ever be made to rear children in a single room. The necessity of providing a full supply of pure and fresh air in youth, when change and growth are most active, is obvious. Whatever has been said of the general requirements of a house, it is in the nursery where all that is most essential to health and comfort should be most perfectly represented. The active man, whose duties for the greater part of the day call him abroad, sooner forgets his fatigue, and has his strength for renewed activity more thoroughly restored, where a healthy home awaits his return. For those who have to spend most of their time within, from duty or necessity, the greatest care in all the details of a wholesome dwelling are most wanted. The strong man after free respiration out of doors may pass through foul or damp air in the basement of the house with the inner breath of his capacious chest untouched ; he may sit in a close hot parlour without enervation, or sleep in a chilled bedroom without his vigorous circulation being seriously depressed. Not so those who stay at home ; from these evils even the

strong would suffer ; delicate women, susceptible youth, tender childhood suffer most. The mature and robust bear cold well, so that the air be dry and pure ; the young must have warmth. Another necessity for those much indoors is light. No room can be healthy however well calculated for its inmates, unless, in addition to the requisite air-space, the air it contains is being constantly renewed ; this is ventilation. Most important of all those requirements is cleanliness.

The cares exercised for a healthy person kept in bed by an accident, or for an invalid confined to the house or room for a season, set forth what infants always need. At first the comfort of the bed room is everything ; the night is not all rest, and part of the day has to be shaded into night. Soon it becomes possible to change the room for a time ; then, open the windows, brush the floor, dust and clean the chamber, so as to replenish it with pure air, and remove the myriad particles ever spoiling the oxygen of its freshness. While the room is still occupied much of this can be done ; done quickly, that the temperature be not lowered unduly, and so done as not to expose the patient to chill. The air of the room must be changed, to some extent, both in the day and at night ; a partly-open door or window only admits fresh air to some part of the room, but if not to the part of the room occupied, or even to the very face of the occupant, the breath is breathed over again, and effete matters or injurious emanations mingle with the vital air. A special atmosphere, readily vitiated, forms around a cot or within the curtains of a bed. The lowest layers of air about or under a bed, or by the cot near it, become soonest impure ; respired vapour is heavy, and contains moisture, with numerous particles that settle in it, contaminating the lower stratum of air even when nothing is left near the bed that should be removed.

Young children bear cold badly. In removing them to a separate room means must be taken to secure moderate warmth. Sudden changes of temperature are to be avoided, and special care must be taken against any long continuance in a low temperature. A small child soon loses heat, and is most depressed by such loss during sleep. In many cases of illness or weakness a fall of ten degrees in the child's room may be of the utmost injury. Besides proper means of warming children's rooms, and care to see that windows are closed in cold weather after the air of the room is changed, the chamber thermometer, an indispensable requisite for the nursery, must always be consulted. The bath thermometer, with its metal trough and high index, often extending to the boiling-point at 212° , does not answer the purpose ; and, moreover, should always be kept in the bath-room

to be ready for use in any bath, whether cold, tepid, or hot ; but a cheaper instrument, mounted on wood, with more open register, the degrees from 50 to 70 conspicuously marked, should be so placed in any room that the variations can easily be noted.

The temperature of the room is a fair guide for the cold and tepid bath. It is well to add a little warm water to the children's bath, or to wash them in warm or tepid water and sponge over the surface with water of the temperature of the room, just before drying with a warm towel and gentle friction. The ablution of young infants must always be in warm water about 90° , or raised as much above the temperature of the room as the nurse may judge necessary ; here the sensation of the hand and arm may generally be trusted, but the correctness of the estimate should now and then be tested by a thermometer. A warm, or hot bath, for the complete immersion of a child, should never be given without careful use of an accurate thermometer. A temperature of 98° is quite enough to begin with, and even then the child should be immersed gradually and gently. For the relief of pain a heat of 99° or 100° may be required ; if so, the child should be removed on to a warm flannel while more hot water is added, and the exact thermometric degree obtained. No hurry is ever allowable in preparing a hot bath. Many of the emergencies for which a hot bath is recommended would be more safely managed with merely a warm or tepid bath. Time is also required for consideration as to whether a hot bath is appropriate ; it is seldom proper during febrile symptoms of any kind ; elevating the temperature of the blood above the normal is a stimulus to be used with caution ; warmth just sufficient to dilate the surface circulation, while still below the body-heat, cools the blood as it comes by successive pulsations in contact with the surrounding medium, and often gives much internal relief. Any sudden impress of heat tends to close the surface vessels, much as the shock of cold would do, for the moment. Too warm a medium, beyond the excitement at first produced, rapidly induces exhaustion in young creatures. Older persons may be reminded that in consequence of the contraction of the surface-vessels by sudden chill, less heat is abstracted from the body by a plunge into ice-cold water than by a long stay in water not many degrees below the heat of the body. This applies to the bath in health ; a good swimmer may indulge long in the summer bath, as exercise raises the body-heat ; the morning "tub" should be a short process. A bath to lower fever should not be far below the degree of fever present.

Children sometimes suffer fatigue or chill from the way in which they are first dressed in the morning ; they require a

biscuit or some milk as soon as they get up, and before the ablutions begin ; it is much better to give them a general wash in warmed water, in which they could stand while being sponged over with cool or tepid water, than to chill them when their powers of reaction are at their lowest. The soap used should not be irritating from excess of alkali, or from impure and imperfectly combined ingredients. Babies most easily suffer from this, and also from want of care in the warmth of the water used, or from harsh rubbing ; they also suffer many things both from the kind of dress and the fashion of dressing them ; a broad band is so rolled on as to compress the abdomen, and comes up so high on the chest as to interfere both directly and indirectly with free breathing ; then come complex, many-stringed instruments of torture, while thick folds of linen, flannel, or even macintosh, curiously involve the legs ; over all comes an inexplicable length of garment that is actually doubled on to the child, so as to ensure every form of over-heating, pressure, and encumberment. After a month of this process, aided by hoods, flannels, shawls, and wraps of all kinds, a strange variation is adopted ; the under bands and folds are left, but a short outer garment is provided, with curious holes cut in the stiffened edges, so as to make sure that it shall afford no protection to legs, arms, or neck, if it were, indeed, fashioned to cover or even to come at all close to them. To prevent the possibility of this, and thoroughly to expose the chest and arms a string or ribbon ties the edge of the degenerated or absorbed neck or shoulder-piece to what remains of a rudimentary or metamorphosed sleeve.

It is interesting to know that this picturesque fragment of some past phase of dress development can be preserved without the sacrifice of effective covering by inserting a close sleeve, or putting beneath the frills a little knitted jacket ; or one of soft texture can be made to go moderately high on to the neck, with a seam over the shoulder, to let it lie flat to the upper part of the chest, and a sleeve cut with a good angle for the elbow and a very short inside seam ; this bit of clothing, if of nice material and colour, has a pretty effect under the open-work embroidery, thus shown off to advantage without risking the exposure of half the child's body. Effective protection of the other half, which it is most important to keep warm, presents greater difficulties. Much irritation is produced by keeping damp clothes close to the skin, and more when caustic soda has been used in washing and is left from careless rinsing and drying. All impervious wraps are to be avoided ; there must be frequent changes of linen. An infant's tender skin has to be kept dry ; it is soothed and protected by the use of violet powder after being washed. The best toilet powders are, in some degree, antiseptic, and are constantly

improving in this direction. French chalk, white fuller's earth, or Taylor's Cimolia already replace starch, and, instead of orris-root, eucalyptus oil, oleate of zinc or boracic acid might be, and are, used in nursery powder; some of the milder disinfecting powders may be sparingly brought into use.

Young children suffer much from the direct effect of a hot sun, or from hot weather and out-door exertion during the hotter parts of the day. Not only is sun-stroke, or the fever of insolation, a danger, but the enervation from heat renders children specially unable to resist many of the diseases of warm seasons, particularly diarrhœa. Besides care as to the time for, and duration of, exercise and exposure in hot seasons and climates, cooling the room by ventilation, perhaps with evaporation outside and ice within, should be attended to. The degree of warmth that enfeebles us is also that most favourable to many lower forms of life inimical to ours, and to many of the disintegrating changes on which they flourish; great care is therefore necessary in keeping rooms, inside and outside, clear of all refuse that might favour their development; also that no remains of food are left in dwelling-rooms, nor any article of diet kept there.

In warm weather various methods of artificial refrigeration will be required for the food kept in the house. A porous cover for some things, with means of evaporation, will answer, or ice can be used. It is not always easy nor convenient to keep the larder below 50°, yet there is risk in having any kind of food day by day in rooms at the temperature suitable for one's own health or comfort. There are other reasons to be given farther on for not allowing milk, bread and butter, biscuits, or fruit to be kept in the nursery, but here it is well to insist on one particular point—viz., that the temperature of a room for children to live in should be higher than that where food can be safely kept; and, conversely, that a room cool enough for a larder is not fit for a nursery.

Short contact with quite cold air or water is injurious to infants; prolonged exposure to the low temperature of a cold house or chamber still more so; most so when the air is not only cold, but damp. In houses otherwise healthy, the onset of acute disease in children, of inward congestions, glandular swelling, tubercle, dropsy, has started from the occurrence of unusually low temperature in their rooms, during exceptionally cold weather, when the means of maintaining sufficient warmth have been neglected, or applied with difficulty.* Children are also

* The germs of some diseases, as the *micrococcus* of pneumonia for one, are either always present in the body or readily developed from healthy protoplasm under the influence of chill or depression.

to be guarded against sudden changes of temperature. After some days in a well-warmed room the first promenade should be short. A child of four or five years old cannot bear a long walk in cold weather, but soon tires, and is then still more liable to suffer from cold. Out of doors, children passing from a sheltered to an exposed position, the turn of a street, the draught in a passage, may get a chill; or, returning indoors hot and excited from running or play, the wraps being removed though the room to which they have returned is only half warmed, perhaps has become too far cooled from open windows or neglected fire, they catch cold more on coming indoors than on going out. An infant in arms is often chilled in this way; closely muffled at starting out, carried near the nurse's body, under warm coverings, or shut in a carriage with closed windows, it is brought home, hot and perspiring, and laid down asleep (its load of clothes removed) on a cold cot in the chill quiet of the bedroom, while the other children prepare for dinner; no wonder the youngest suffers first. Not only should the woollen clothes and coverings not be removed at once, but the chamber thermometer should be consulted. Prevention of illness is better than cure, and for both objects a thermometer in the children's room is indispensable. The delicate and expensive clinical thermometer, invaluable in marking the changes of disease, and useful in some of the variations in health when in skilled hands, is often misleading in the nursery; there its only safe purpose, in the hands of the nurse, is to test the accuracy of the bath thermometer.

The best and most trustworthy means of being assured of the continuous well-being of infants and children is an accurate record of their weight. In infants weight alone may be depended upon; for older children, growth as measured by height must also be noted. The two taken together, if increasing, afford evidence of progress, and, if interrupted, give timely warning of some impending difficulties. At first, gain in weight is much more marked than increase in length; these increments seldom advance in close proportion to each other, though a certain relation between the two should always be preserved. An increase in weight often precedes further growth, and rapid growth is often interrupted while weight is being made up. Particular care both as to rest, occupation, and food is required when a growing child ceases to gain in weight.

The rate of growth for young children varies greatly at different periods of infancy, and follows laws of its own.

The proportion between the age, weight, and height of infants has a bearing on successful nursery management of much the same import as that observed all through the period of child-

hood. On comparing healthy, well-fed infants, with others on artificial food, very little difference in height is found at first, but instead of gaining four pounds of weight in three months, they gain less than three pounds, and advance by half a pound monthly, instead of by a pound or more. The rapid rate of increase in the earlier months of infancy, and the variations which are then observable, make a separate study of this period essential. A vigorous healthy child should double its birth-weight in the first four or five months, and treble it at a year old. This rate of growth is not uniform, nor does it proceed at any steadily-decreasing ratio, but is subject to the variations shown on the diagrams.

Fig. 407 is a diagram of the rate of increase for the first year, from "Our Homes" by permission :—

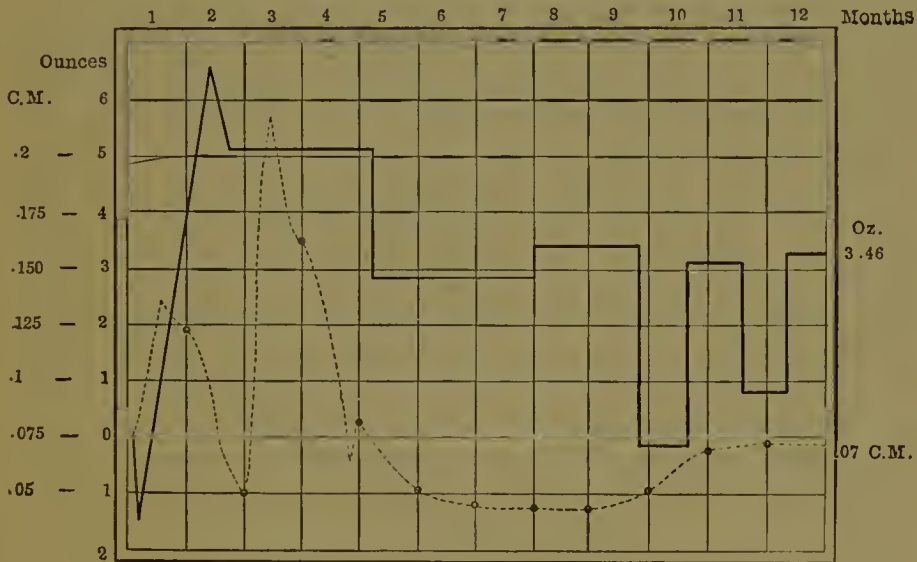


Fig. 407.—The black line shows the Average Weekly Rate of Increase in ounces, The dotted line gives the Average Daily Growth in centimetres, two fifths of an inch, from measurements by Dr. Haehner.

At first, under the new conditions of life, there is always a *loss* of weight, amounting on the second and third day to three or four ounces a day ; so that a child three days old may weigh half a pound less than it did at birth. This is called the physiological loss, and is said to average six per cent. of the birth-weight. Nutritive matters, or the waste of past nutritive processes, stored up in the body of the child, are now utilised, and the way is cleared for new material to be readily assimilated. Very soon, after food is taken freely, the loss of weight ceases ;

often a gain begins on the fourth day. The first loss in weight is mostly, or should be always, more than made up before the end of the first week. A progressive increase of weight now goes on at the rate of two or three ounces for the second week, at four and five ounces for the next two weeks, and at six ounces a week, or even an ounce a day, in part of the second month, when the increase is greatest. For the next two months a uniform gain, at the rate of five ounces a week, is maintained, while growth is more rapid than in the previous month. In the fifth, sixth, and seventh month, the rate of increase for weight falls to three ounces a week; growth also pauses a little, and both undergo some variation while dentition is proceeding. The natural period of most rapid growth comes to a pause about the fifth month in healthy children, when the teeth are forming, and a further demand on the nutritive supply is made. Care has to be taken lest this pause be unduly prolonged, and a downward tendency advance to positive illness. We see also the first increase of weight checked as growth increases, so that some processes may be less active while a new direction is given to healthy development.

This holds good for all stages of growth, it is specially marked by a pause in the rapid growth of girls as periodic functions are established. In undue stress upon a child's mental powers nutritive energy is checked; a loss of weight should suggest timely relaxation of study before increase in height is interfered with; on the other hand rapid growth should be met with some leniency as to lessons, for attention is less sustained at such times, and work done then to be good in quality must be lessened in quantity. An example of the harm done by arrested growth is well seen in the transverse mark on the permanent teeth caused by severe illness, or a short convulsive attack, during the first dentition. The second teeth are then forming, and as they suffer permanently so must other structures essential to future vigour. It is possible that the fall in growth-rate from six to ten months, both in weight and height, seen in the diagram, would be less if dentition were aided by some fitter food supply. The formation of teeth is itself an evidence of healthy progress; any interruption of health delays their appearance. To persist in the use of diluted milk, highly charged with sugar, or thickened with the starch of corn-flour, instead of with whole meal or other more substantial food, until the teeth appear, is to become involved in a vicious circle from which the escape is slow, and not without risk. Good teeth are the sign of precedent health; not only do the first teeth decay early when health has been precarious in infancy, but in serious constitutional disease,

the second set of teeth will be injured, and the six-year-old molars imperfect. In estimating healthy development at the end of childhood, the change of teeth, and the appearance of the bicusps and large molars, at twelve years old, is as much part of healthy growth as the increase in weight and height then observable.

The diagram of these changes will serve to fix attention on normal progress of infantile growth, and as a reference-table by which any slight departure from health in the earlier months may be at once recognised, and so lead to the detection, perhaps to the removal, of its cause before any serious interference with sound development has occurred.

Much of the comfort and happiness of all concerned depends upon the uninterrupted well-being and steady nutrition of infants in the earlier months. Regular and systematic weighing, as the only trustworthy criterion of healthy infantile progress, has of late years been widely adopted in the public institutions of France and Germany. We are indebted to Anna Angell, of the New York Infant Asylum, for many hundred careful observations, week after week, for a year. The results agree very closely with those obtained by other observers; they are approximately given in the following diagram, Fig. 408. (*From "Our Homes."*)



Fig. 408.—Average Weekly Gain in Weight for each Month, drawn from observations by Dr. Anna Angell, of New York. The dotted line shows Bouchut's estimate of the Progressive Decline in Rate of Growth.

By these Figures the rapid rate of growth after the first week is seen at a glance. The critical time for making sure that the infant is obtaining the proper supply of food, and is thriving on it, is in the first six weeks, and there is no means of doing this so reliable as weighing. In this way the check to nutrition is often discovered before any of the painful, and often unmanage-

able, symptoms of athrepsia are declared. There are some conditions unfavourable to the health of infants not discoverable by weighing, but this means would serve to point out the most frequent of them in time to avert their worst consequences.

For infants under three years of age, weight is the best criterion of progress; for children of three years old and upwards, height and weight must always be taken together; in order to judge of healthy growth it may be sufficient to do this three or four times a year.

Growth is very irregular in children and young people generally; perhaps two inches may be gained in two months, and for the next ten months not another inch, even up to the ages of ten or twelve years. This increase is most noticed in the spring and early summer with us; but it is not restricted to this part of the year as seems to be the case in more northern latitudes. While growth is most rapid, fatigue is readily induced; during the pause weight is gained, and work or training can go on again.

In the first two years after birth a child should gain twenty pounds in weight and ten inches in height. The chief increase in growth and weight is in the first year, thirteen or fourteen pounds of the gain in weight being in the first year, and seven or eight pounds in the second. The third year also is one of active growth, the first dentition is completed, and the child often gains four inches in height with four or five pounds in weight. From four to ten years of age a more uniform increase proceeds at the rate of about four pounds a year in weight and two or three inches in height; after ten years the rate of increase in weight for the next five years is doubled. Unsuitable food, defective teeth, bad hygiene, and the various infantile ailments at any time check nutrition, so that the weight of sixty-five pounds and the height of fifty-four inches, or four feet six inches, is not always attained before twelve years of age.

With big children the rate of increase is rather greater than in the small and weakly. A rather higher average is found for boys than girls; the boys may have at birth an excess of ten ounces in weight and half an inch in length, but this is of very little importance, as individuals of either sex may commence life at a weight of nearly two pounds, more or less, than the average. Setting aside the extremes, and taking children who are within a pound weight either way of the ordinary size at birth, there is less difference than might be expected in the rate of growth after the first year. This is also true for the difference in sex, and exactly corresponding weight and measure for both sexes at each age up to ten or twelve years occur; at this time girls grow as fast as boys or faster, and often increase as much in weight, but growth ceases sooner with them.

TABLE OF CHILDREN'S HEIGHTS AND WEIGHTS.

(For both sexes : add to height half an inch for shoes, and to weight 5, 7, or 10 lbs., according to age, for clothes.)

Age.	Average Height.	Average Weight.	Range more and less.	
			in inches.	in lbs.
At birth.	19 inches	7 lbs.	3	+ 5 - 2
1 year.	28 "	21 "	4	4 - 3
2 "	32 "	28 "	4	3
3 "	35 "	31 "	4	3
4 "	38 "	35 "	4	5
5 "	41 "	40 "	4½	5 - 3
6 "	43 "	44 "	5	6
7 "	45 "	48 "	4½	8
8 "	47 "	52 "	4	10
9 "	49 "	56 "	4	10
10 "	51 "	60 "	4	10
11 "	54 "	67 "	5	12
12 "	56 "	72 "	6	14
13 "	58 "	80 "	7	19+
14 "	60 "	90 "	8	20+
15 "	62 "	100 "	8	25+

The above are the limits found to be consistent with health in children. Divergences due to illness or markedly abnormal in either direction, have not been taken into account. The birth of a child weighing twenty pounds is recorded in the *Lancet*, Vol. II., 1886. A Gargantua at a year old, of three feet in length and five stones, or seventy pounds weight, who gained two stones in the next half year, is reported from Canada. Exceptional growth more often occurs from the age of twelve onwards; but neither Brobdignadians, nor Lilliputians, however healthy, are included in the above averages.

The range in both directions is given from cases under my own observation; the results have been compared with Tables in Charles Robert's "Manual of Anthropometry." Weight should vary with height, thus lads who are only fifty-four inches high at fifteen and sixteen weigh seventy pounds, the same as boys who are that height at twelve years; yet rapid growth has to be allowed for on the one side and mature age on the other. A youth five feet four inches at thirteen weighed over one hundred pounds, but others the same height at seventeen and nineteen years of age were from five to ten pounds heavier; an addition of this amount has to be made in estimating the right ratio of weight to height in adults.

The circumference of the chest, and the degree of expansion

at different ages is noteworthy. The average chest measurements of 3,362 children from eight to ten years of age was from $22\frac{1}{2}$ to 23 inches after breathing out, and 24 to 25 inches after drawing a full breath ; of 3,478 children, eleven and twelve years of age, the average was, chest empty, 24 and $24\frac{1}{2}$ inches ; chest full, 26 and $26\frac{1}{2}$ inches. Rather more boys than girls were measured, they were factory hands ; the boys had a somewhat freer chest expansion. My own measurements give 27 and 30 inches for girls twelve years of age.

Of the changes produced by illness in children, two or three instances may be given. First, a boy ten years old, after scarlet fever had lost four pounds in weight ; this he regained in one month after convalescence, and added another five pounds in the next three months. Second, a weakly boy, eight years old, height forty-six inches, weight forty-two pounds, had gained no weight and but one inch in height during six months' care in London ; he then goes into the country for three months—August, September, and October—gains eight pounds and grows another inch ; at nine years old he gets to the proportions of fifty pounds and fifty inches, the average height but not the average weight, until, after another year of care, he became strong and well. Another boy of this age, the same weight but an inch shorter, made no advance, and then, with slight febrile action, began to lose flesh, till his weight in pounds became less than his height in inches ; he did not recover. It may be noted in the table that till the sixth year the height in inches exceeds the weight in pounds, and that, from eight to twelve years, the height in feet and the weight in stones nearly correspond ; as growth advances a still further increase of weight over height should occur. A child in the fourth year should be three feet high, and weigh more than two stones ; in the sixth year, three and a half feet high, and weigh three stones ; in the ninth year, four feet high and four stones in weight. At adolescence, one stone should be gained for every two or three inches of height ; eight stones for five feet four inches ; ten stones for five feet eight ; eleven stones for five feet eleven inches ; and twelve stones for six feet of height is good weight.

The increase of short-sightedness with the increase of education, is an evil so important to guard against and prevent, that some of the rules to this end will be explained. Young children must have a good light while they are busy ; they should not be long engaged with small objects very near the eyes, close attention to threading beads, or toys held to the mouth for blowing through, may lead to weak or short sight, or to squinting. A stooping position and too prolonged attention conspire, with other causes, as a child's instruction advances, to produce that

widely spread but avoidable evil of civilized life, short sight. Books for the young should have large type and not be used in a dim or a hot glaring light. Insufficient or ill-arranged light obliges us to lessen the distance between the eye and the book ; this is done in twilight, and must occur if the desk and seats are not rightly proportioned. Children are sometimes seated on insufficiently raised seats and so have their faces too near the table. Ten inches should be the least distance between the eye and the book, and copy-books should not be placed straight upon the desk, but so that the lines slope upwards to the right ; a straight down-stroke can then be made without bringing the left eye too near the paper, or giving a twist to the head and body. For writing, the paper should be raised by an angle of 20° ; for reading, the book is better raised to 40° ; the two eyes can thus be moved along the lines without fatiguing the muscles or compressing the eye, then the book must not be too far on the table, or the child will have to sit on the edge of the seat and lean forward and press against the chest, or use the arms in support. The seats must have backs, not too high, and not standing backwards ; the back ought to be straight, with a firm bar of wood about three inches broad to come across the loins close above the hips. The seat should be broad enough to take the whole length of the thigh, and a foot-board should be so fixed as to let the foot rest naturally on it. The edge of the desk must be perpendicularly above that of the seat, and just high enough to allow the elbow to rest on it, without displacing the shoulders. For school work the back of the seats should consist only of the support before mentioned ; for boys it should be one inch lower than the edge of the table, and for girls one inch higher than the table. The keyboard of a piano is 2ft. 3in. high ; for children, a high chair, with low back and movable foot-rest, should take the place of the music-stool. Too long a time at once is often directed to lessons ; the length of application or attention has to be varied with the age of the child.

Not only short sight, but various spinal deformities, result from inattention to the above directions. The reciprocal influence of seats and lighting is well insisted on by Mr. Liebreich ; he says, "A back-rest is necessary to avoid short-sightedness, and good light is necessary to avoid curvature of the spine. For preservation of sight, as well as of a normal figure, the possibility of remaining in a normal posture during school time, and especially when writing, is an absolute necessity."

Growing girls require a complete and easy rest for the body during some part of the day. In Mr. Liebreich's lectures on

"School Life and its Influence on Sight and Figure," a model of a good chair for this purpose is given. The essential part of this is the firm upper surface bent to follow the curves of the spine, and so give complete support and rest to the back. By prolonging the lower end a little downwards, and adding a projecting foot to the lowest part of the back, the framework is done away with, and the bent board will stand firmly anywhere, and form a very convenient reclining-board. Messrs. Callaghan, New Bond Street, are the agents for this simple structure.



Such boards are very useful, for a rest of ten minutes, in relieving the fatigue of the upright position, or in the intervals of lessons when active play is not to be had. By means of easy rest and varied exercise, rather than by the rigid back-board and wooden foot-frame of a past age, we may hope to avoid the tendency to spinal curvature and short-sightedness so frequently met with.

A careful hygiene should guard the early training of childhood from every hindrance to full development, and from all interference with growth, activity and health.

